15. A method for overcurrent protection in a superconducting cable comprising a current detector, which is inserted in series with cable conductors of the superconducting cable, wherein an electrical conductor is integrated in the cable construction during cable manufacturing and said electrical conductor is electrically connected in parallel with both the cable conductors of the superconducting cable and the current detector, and said electrical conductor has a higher impedance than the superconducting cable when said cable is in its superconducting state.

16. A method according to claim 15, wherein at least part of said electrical conductor is placed outside the cryostat of the superconducting cable.

17. A method according to claim 15, wherein said electrical conductor is placed outside the cryostat of the superconducting cable.

18. A method according to claim 15, wherein said electrical conductor is placed inside the cryostat of the superconducting cable.

19. A method according to claim 15, wherein at least one superconducting piece is inserted as the current detector.

20. A method according to claim 15, wherein the current detector comprises a superconducting material which quenches at a lower current than the superconducting cable.

21. A method according to claim 15, wherein the current detector comprises a

circuit breaker, e.g. a fuse, a thyristor, a transistor, or similar power electronic components.

22. A method according to claim 15, wherein the current detector is constituted by a current-dependent resistance.

23. A method according to claim 15, wherein a cold shunt is inserted in parallel with the cable conductors of the superconducting cable

24. A superconducting cable wherein the cable conductors of the cable are connected in series with a current detector for overcurrent detection, and it comprises an electrical conductor electrically connected in parallel with both the cable conductors of the superconducting cable and the current detector, and said electrical conductor has a higher impedance than the superconducting cable when said cable is in its superconducting state.

25. A superconducting cable according to claim 24, wherein at least part of said electrical conductor is placed outside the cryostat of the superconducting cable.

26. A superconducting cable according to claim 24, wherein said electrical conductor is placed outside the cryostat of the superconducting cable.

27. A superconducting cable according to claim 24, wherein said electrical conductor is placed inside the cryostat of the superconducting cable.

28. A superconducting cable according to claim 24, wherein the part of said

electrical conductor placed inside the superconducting cable and performing the function of a cold shunt, is wound in such a way that the current in this is reduced to a minimum during normal operation.

29. A superconducting cable according to claim 24, wherein the current detector comprises a circuit breaker or a current limiter, and that the circuit breaker comprises a fuse and/or high-speed power electronics.

30. A superconducting cable according to claim 24, wherein the current detector is constituted by a superconducting material such as YBCO or Bi 2212.

REMARKS

The advantages of the invention as formulated in amended Claim 15 (and the corresponding apparatus Claim 24)) over the prior art are the following:

- The invention integrates a shunt in the cable (it is not a coupling of discrete components).
- In case of an over-current situation, the electrical conductor diverts a substantial part of the current from the superconducting cable and the current detector (it does not break the current or limit the over-current substantially), which has the advantages of
- resulting in a reduced switch-on time
- enabling a simpler current detector construction, because of lower potential differences over the component
- thus improving performance and reducing costs.

We have amended independent method and product claims (Claims 1 and 10, respectively) to stress that the electrical conductor inserted in parallel with the cable conductors should not carry the current when the cable conductors are in a superconducting state (cf. original Claim 5).

We have made independent claims that exemplify that the electrical conductor may be placed fully or partially inside or outside the cryostat.

Respectfully submitted,

WILLIAM R. EVANS
LADAS & PARRY
26 WEST 61ST STREET
NEW YORK, NEW YORK 10023
REG.NO.25858(212)708-1930